

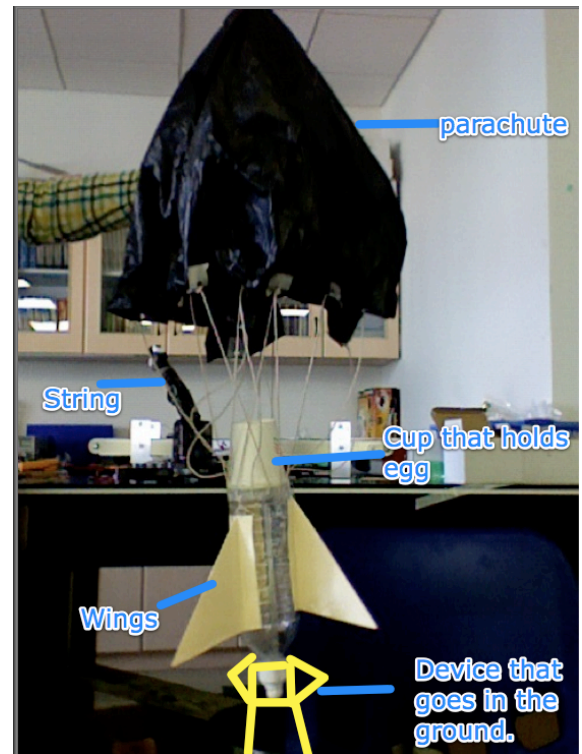
Our Design Challenge:

For our project we chose to make 3 bottle rockets that can shoot up to at least 10m, that can deploy down safely to earth using a parachute, and carry an egg to safety

Procedure to make the rocket (refer to figure 1):

1. get a empty water bottle
2. attach 3 cardboard (manila folder) wings equal distance away from each other
3. attach paper cup to bottom of bottle
4. cut garbage bag to make parachute
5. tie strings to parachute
6. secure string and wings with clear tape.
7. attach string to rocket
8. to make the cone we used plastic folders and put clay in the tip

Fig 1:
This diagram shows how the rocket will work and how we constructed it.



Science concept used during experiment:

Weight: Weight has to do with the speed and height the rocket will travel. It's an important factor to keep in mind while we design this rocket. For example, the wings of the rocket could easily weigh down the rocket, keeping it from flying its highest potential height. While the structure must be sturdy, the weight cannot be too heavy and must be just right.

Air resistance: When the rocket is shot into the air, right away air pushing an equal and opposite force against the rocket as it tries to accelerate into the sky any further. (Refer to Fig.2)

Pressure: The pressure is very important with this experiment. For each launch we have the correct amount of pressure inside the rocket. If we have too little the force to push the rocket up will be too little, and if there is too much the rocket may burst from too much force against the sides of the bottle.

Inertia: This factor will be most important in making sure the dispatch of the parachute works just right. Though I'm not too sure about what it is, It is an important factor for the parachute part which is a basic half of the assignment.

Gravity: Even before the rocket takes off gravity is pushing on it. Gravity is also important, because it is what carries the rocket to the ground when it is using the



Figure 2:
This diagram is showing the forces acting on the rocket after it deploys the parachute and is slowly coming down to earth.

parachute. If gravity didn't pull down then the rocket would just float there.
(Refer to Fig.2)

Acceleration: When we begin to pump the air into the rocket, the more air there is the faster the rocket will accelerate into the air. This means we want to pump the rocket to its maximum capacity.

Terminal Velocity: This mainly has to do with the parachute and what happens after it deploys. After it has fallen for a few seconds it will reach a certain velocity (terminal velocity) which means it will no longer fall any faster. This makes it so the egg will come down safely.

Mass: The mass of the rocket is important, because if it is too large or too small the rocket will not take off properly.

Progress of our bottle rocket:

Day 1:

All of working on doing the test run of how to see how the device works to shoot off the bottle rocket. We had quite a few trial and error, but finally we got to shoot up really high. Now that we know how it works we can work on the design of the rocket.

Day 2:

Today we put the wings on our rockets. We use folders to get a sturdy wing. We then put them on the bottle using a hot glue gun after that we just wanted to make sure the wings were a bit reinforced we did this by taking tape and covering the wings with it. We are also testing to see if it will make the bottle go higher or not as high if the wings are turned the other way around.

Day 3:

Today we were going to try to test out rocket with the new improved pumping device, but instead we had decided to work on making the parachute we use a garbage bag and string we got one about done and now we just have to make 2 more that are a bit smaller.

Day 4:

Today we went and got some supplies to work on the design of our bottle rocket. we got paper cups, plastic folders, string and garbage bags. we finished making two full

parachutes we also started on making the cone for the rocket where the egg will go and the parachute will come out of.

Day 5: Today we finished off the parachutes by connecting them to the rockets. We also figured out a good way to put the cone on top of the rocket so that it would easily fall off and let the parachute deploy. We decided to check to see if the parachute worked before we tested it getting shot into the air. So we went to the third floor balcony and dropped it. The parachute worked very well and carried it very gracefully. Once we saw they worked we decided to test launching it. We have discovered that we need to add rods to the rockets, because every time we set them off they fall over then shoot. To solve this we are putting straws on the side of the rockets then we will hammer then rods into the ground that will go through the straws. This will keep the rocket up tight so that it will fly straight into the air

Day 6:

Today we went outside and shot off the rocket to see if the parachute worked after being shot into the air. We were very happy to see that it worked, and came to the ground very softly. We also reached our criteria, because it went at least 10m in the air. The only problem we had that we need to fix, is that we need to make the strings for the parachutes more secure. Because the rocket that we tested had three strings pop off. Now all we have left is to test if it will be able to hold the egg and bring it to safety.

Citation

<http://www.lnhs.org/hayhurst/rockets>

